DOCUMENT RESUME

ED 267 789 IR 012 157

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TITLE Interactive Cable Television: An Evaluation Study.
PUB DATE Jan 86
NOTE 14p.; Paper presented at the Annual Convention of the Association for Educational Communications and Technology (Las Vegas, NV, January 16-21, 1986). For entire proceedings, see IR 012 121.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; Attitude Measures; *Cable Television; *Educational Television; Evaluation Methods; High Schools; Instructional Innovation; Interviews; Research Methodology; *Rural Education; *Small Schools; Student Attitudes; Surveys; *Telecourses
IDENTIFIERS AECT Research and Theory Division Meeting; *Instructional Effectiveness; *Interactive Cable System

ABSTRACT

This study assessed the second year of a 5-year project--the Carroll Instructional Television Consortium--which uses two-way interactive cable television (both audio and video) as an alternative method of delivering courses in four small rural high schools in Illinois. Specific evaluation questions investigated the instructional effectiveness of interactive television; its effects on the teaching/learning process; acceptance of the system by participating students, teachers, and administrators; and successful attainment of the project's goals. Data were collected via student pre- and posttests, student and teacher surveys, observation of teachers, and interviews with administrators concerning their level of satisfaction with the project. Results indicate that: (1) students enrolled in courses over the interactive system perform almost as well as students enrolled in the same class taught in the traditional setting; (2) students reacted positively to the system; (3) the biggest problem with the interactive system is that it does not allow students to get to know classmates from the other schools; (4) the biggest obstacle to the teaching/learning process was "downtime"; (5) 80.1% of the students surveyed rated the system average to excellent; and (6) all project goals were met, and in some cases, surpassed. A list of references and a sample student survey are provided. (JB)

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Interactive Cable Television: An Evaluation Study

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IR012157

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Background

Educators are taking advantage of new opportunities to expand or improve education through cable television and microwave technology. Telecommunications can extend the classroom and learning potential for hundreds of students. Teleconferencing, one use of telecommunications, has become viable for education, training, and business meetings both in education and business and industry. Teleconferencing is a dynamic, live, interactive process which allows students in different locations to communicate and participate in an interactive educational experience (Olgren and Parker, 1983). Interactive television is one form of instructional television which has proved to be an effective and popular medium of instruction, more so than the ITV programs first introduced in the 1950's (Bloom, 1984).

There are many critics who "believe that education is the only major American industry which does not yet make intensive use of modern technologies to reduce its costs and to increase the scope of its services" (Curtis and Biedenbach, 1979, p. 3). Several interactive television projects around the country have begun to utilize technology in an innovative yet practical way to increase the overall effectiveness and availability of educational opportunities in their communities.

A project begun in Illinois in August, 1983 is an attempt to utilize new and emerging technologies to increase the effectiveness of the educational process. This project, the Carroll Instructional Television Consortium, was the first cooperative educational program of its kind in Illinois, and was born of the common need of four small rural high schools to offer a full range of academic opportunity to their students. The Consortium utilizes a cable television network already serving the four districts. The system permits simultaneous video and audio communication between any or all of the four high schools. The two-way television consortium represents a technologically acceptable method for sharing instructional resources, better utilizing faculty expertise and more fully serving the academic needs of students.

The project goals of the Carroll Instructional Television Consortium are:

1. To increase the total number of course offerings available to students enrolled in the participating districts.

2. To provide fully qualified, experienced, and effective faculty to teach advanced level course work in mathematics, science and foreign languages.

3. To motivate and challenge talented and gifted students through association with comparable students from other districts.

4. To promote high levels of student achievement as measured by content mastery of advanced level course work.

5. To increase the efficiency of teacher instructional time in traditionally low enrollment advanced level curricular offerings.

Based initially on these goals, project evaluation was designed as a five year process. The research has broadened some to include many factors of the environment, and to be as complete as possible.

Project evaluation of this scope has many inherent problems. The subjectivity of observation, the lack of control of population or teaching methods, the gaps in communication or cooperation all prevent the researchers from utilizing experimental research procedures which could add more data to comparative studies literature. Instead, the design of this research was based on naturalistic research premises; the outcomes will be non-statistical but rich data about the school environment and the project's success. This study employs a naturalistic paradigm to investigate a technologically innovative project using two-way interactive television as a vehicle to enhance curriculum.

Although this is a fairly recent technology, some studies have reported on utilization of interactive television instruction. Interactive television has been successfully integrated into education systems and is a cost-effective means of augmenting the quality of education available to students, especially in rural areas. This instructional technology increases the spectrum of courses available in small school districts and offers an alternative solution to consolidation of the school districts (Holt, 1985). It is a means to developing an educational system that "substantially expands and increases high school curriculum" (School Tech News, 1985). Microwave and cable transmission of two-way video provide students from surrounding school districts with the opportunity to enroll in courses which otherwise would have been available to only one school due to a shortage of specialized instructors. Advanced levels of foreign languages, science and mathematics are high school courses typically offered. Sharing of subject matter experts eliminates the need for students to be transported to a central location, or for the instructor to travel to all of the sites (Schramm, 1977). Interactive television (ITV) is also economically feasible because the expenses incurred are shared cooperatively by the school districts involved in the program, and many of these expenses are non-recurring (Pate, 1985). It is most economical to connect the videoconferencing system with an existing cable television network (Howe, 1984).

Courses taught by ITV have been well received by participants, as evidenced by annually increasing enrollment in the courses and an increase in the number of course offerings to accommodate this need (Jones, 1985). Two-way television has been used extensively in school districts throughout the country, and with a high degree of success (Jones, 1985). Microwaves for Learning in Iowa, Communicasting for Educational Purposes in Minnesota and the Irvine project in California, are a few examples cited by Jones. No significant difference in test scores resulted when a College Learning course was taught either in-person or by interactive two way television (Johnson, O'Connor an

Rossing, 1984). Survey results also revealed no negative attitudes regarding the instructional strategy utilized. Graduate students studying supervision via interactive two-way television had positive attitudes about the mode of instruction and learned equally as well as the control group (Johnson, O'Connor, Rossing, 1984).

Though the technology utilization has been studied only recently, these studies revealed a high degree of interest in both the effecthveness of interactive systems and in participants' attitudes towards learning from such systems. Project reports from Trempealeau County Wisconsin and from Texas A & M (Johnson, O'Connor, and Rossing, 1983) show preliminary success. The Carroll I.T.V. Consortium modeled itself in part after the Trempealeau County project. Evaluation reports from Wisconsin were available in the design of the research for this project.

Objectives of the Study

This paper explains the research being conducted to evaluate the project, and the results evident from data collected to date. This study was designed to determine:

1. Is an interactive television system effective?

2. Is the teaching/learning process affected by use of interactive television?

3. Is the interactive television system accepted by the teachers, the students, and administrators?

4. Are the project goals successfully met?

Method

A case study was designed to intensively study the status and interaction of the participants and this project. Data is being collected using several different techniques:

1. Student cognitive growth is measured by pre- and post-tests in their subject matter.

2. Students are surveyed four times during the year to evaluate technical aspects of the system.

3. Teachers are observed throughout the year, approximately 75 hours in total.

4. Administrators involved in the innovation are interviewed about their decision-making process and their satisfaction with the project.

The case study methodology includes many separate data collection techniques, as listed. More specifically, evaluation and data collection includes:

1. A comparison of 1984-85 course offerings with 1983-84 course offerings in each participating district by the district administrator and researcher.

2. Periodic assessments of teacher effectiveness by district administrators and the researcher.

3. A survey of student opinions about teacher effectiveness conducted by the researcher during each quarter of the academic year.

4. A survey of student attitudes and satisfaction conducted by the researcher during the fourth quarter of the academic year.

5. A survey of teacher opinions about student motivation and degree of challenge conducted by the researcher during the fourth quarter of the academic year.

6. Teacher-made tests covering learner objectives identified in course outlines utilized for entry and exit level assessments of student mastery of course content.

7. Analyses of student achievement scores made by the researchers to assess: 1) student growth, and 2) comparison of achievement scores for students located at originating site with those located at remote sites, and with those not in TV classes where available.

8. A comparison made by district administrators of enrollments in the televised classes with enrollments in the same classes taught in individual district during the previous two years.

Thus, the data collection has been triangulated to include pre- and post-tests, student/teacher surveys, and observation and interviews throughout the project. Guba (1981) suggests that triangulation can improve dependability and transferability of data collected in naturalistic inquiry. The trustworthiness of observation and interview data can be enhanced by the collection of survey and cognitive growth data, and by the comparison of results gathered by all three methods. Further explanation of each data source is available (Robinson, 1985).

Results

This study has been designed to evaluate and assess the use of interactive cable television as an alternative method of delivering courses. Once study objectives were established it was then necessary to attempt to determine if those objectives were being met. The results reported here are based on the second year of this five year project.

The first objective was to determine if a two-way interactive television system would be effective. Previous studies have been done on interactive television, but many of those studies examined systems that were one-way video, and two-way audio. This study has examined an interactive system that is two-way audio, and two-way video.

In order to accurately assess the effectiveness of this interactive systems pre- and post-tests were administered. The pre-test was administered to assess entry level skills and abilities of students. The post-test provided data which indicated how well students learned course material. These tests were given to students in all classes taught over the system. Additionally, if a class being taught over the system was also being taught in the traditional manner in one or more of the schools, the same test was given to students in those classes as well. The courses offered over the system were math IV, shorthand, Spanish I and II, and chemistry. Preliminary results have shown that among students taking courses over the system, those students in distant schools are scoring as well as students in home schools (where the course originates). Since many of the classes are small (some have as few as 4 students), comparative statistical analysis is not as valid at this time as it will be at the end of the five year study.

For 1984-1985, a comparison of mean post-test scores has been completed. The post-test score for students in the home school for Spanish II was 171.3 while the mean post-test score for students in that class at the remote school was 193.33. The chemistry class produced similar results: the mean post-test score for the home school students was 33.5; for the remote school students it was 36.43. These two classes demonstrate that students in the remote classes scored a bit better. On the other had, home school students in the Math IV class scored somewhat better than students in the remote schools. Post test mean scores for students in the home school were 91, while mean post-test scores for student in one remote school were 75, and in another remote school were 66.88.

Just as significant is the fact that students enrolled in courses over the interactive system perform almost as well as students enrolled in the same class taught in the traditional setting. One example of this is the Spanish I class. Students in the interactive Spanish I class had mean post-test scores of 206, while students in the traditional Spanish I class had mean post-test scores of 231.

The second study objective was to determine if the teaching/learning process is affected by the use of interactive television. While it is true the term "teaching/learning process" can sometimes be an ambiguous concept, for the purposes of this study it has been defined as any activity associated with the teaching process (i.e. lecturing, class discussion) and any activity associated with the learning process (i.e. class participation, teacher accessibility, interaction with classmates, etc.). Based on the responses to questions on a survey administered four times each year (see Appendix) students reacted positively to the system. Their responses indicate a high degree of satisfaction with these courses.

The students do not feel the technology interfered with the teaching/learning process. 93% report the video reception as good to excellent; 87% indicate they can hear the instructor and students in other locations without any problem; 75.9% thought the talkback feature did not interfere with their ability to communicate with students in other locations; 78.7% report no problems with having access to the instructor after regular class hours; 89.8% report no problems with

receiving handouts, tests and other items in time for assignments; and finally 85.6% believe material in the interactive class is as easy to follow as it is in a regular class. The biggest problem with the interactive system is that it does not really allow students to get to know their classmates from the other schools. 75.4% indicated they had little opportunity to interact with students from other schools.

In over 100 hours of observation, it was noted that the biggest obstacle to the teaching/learning process was "downtime." Because of factors beyond the control of the students or the teachers (i.e. weather, technical difficulties, audio interference) there were times when no instruction was being provided.

The third study objective was to determine if the system would be accepted by the students, the teachers, and administrators. Again, information was collected using students surveys, interviews with teachers and administrators, and observations of classes. 80.1% of the students surveyed gave the system a rating of average to excellent. Only 19.9% reported dissatisfaction with the system. Initial interviews with teachers revealed most had mixed feelings. The teachers expressed fears about being replaced by technology (unfounded), and fears about technology in general (overcome by in-service training). The majority of teachers interviewed agreed that a system such as this was needed to begin offering classes that would not otherwise be offered. In addition, they saw it as a means for increasing student enrollment in their classes.

The fourth study objective was to determine if project goals are being successfully met. As stated earlier, the goals of the project are to:

1. Increase the total number of courses offered.

2. Provide qualified, experienced and effective faculty to teach advanced level courses in math, science, and foreign languages.

3. Motivate and challenge talented and gifted students.

4. Promote high levels of student achievement as measured by content mastery of advanced level course work.

5. Increase the efficiency of teacher instructional time in low enrollment advanced level courses.

Based on research collected to-date through observations and interviews, all of the above goals have been met, and in some cases surpassed. Students are now receiving courses they would not otherwise have had. This has been particularly true in the math, science and foreign language areas. Because the system allows the schools to offer these advanced level courses, talented and gifted students now have an opportunity to work with comparable students from other districts. The only project goal which has not been fully met is to increase the efficiency of teacher instructional time. Because of occasional equipment start-up problems, and inter-district scheduling conflicts, teacher instructional time has not been positively effected.

Discussion

Since the 1940's, educators have looked to technology to revolutionize the education process. However, education has been slow to adopt technology, and that technology has not brought about the sweeping changes once anticipated. Even though millions of dollars have been spent, the results have been disappointing (Prange, 1973).

Interactive television instruction projects such as the Carroll Instructional Television Consortium are an example of the successful use of technology for education. They are not, however, a panacea. There are inherent problems which are possibly unsolvable, but which do not negate the positive effects.

For example, not all students will find learning via technology to be conducive to their learning style. Not all students in interactive television classrooms feel comfortable learning from a "distant" teacher, nor do they feel that they get an opportunity to know classmates in other schools. While teachers have developed techniques to encourage participation, and have provided opportunities for students to get better acquainted in person, these are only partial solutions. Interactive television systems can not eliminate the problems of geographic distance.

In addition, the technology itself is not perfect. Any time technology is involved, the learning process can be interrupted. There will always be problems with atmospheric and external interference. In this project, the cable system can be rendered inoperative by snow, interference from C.B. radio or other low band audio broadcasts, or by cable or power outages. While a two minute breakdown in audio contact may not sound like a technical problem, it certainly has proven to be for the teachers trying to encourage participation between distant schools.

The strengths of this study are its longitudinal design and its triangulated data collection. Instruments utilized are similar to other studies on interactive television projects (Holt, 1985; Johnson, et. al, 1984). To date, after 2 1/2 years of data collection, results have tended to indicate that the two way interactive system can be used successfully in the educational process. Johnson, et. al. (1984) and Brad Winchell of the East Central Minnesota Educational Cooperative have found similar results (School Tech News, 1985).

The data from this study has also revealed a fairly high level of satisfaction with the system, and positive student attitudes. These results are similar to those reported by Johnson and by Denton, et. al., (1985). In its evaluation of the project, the study objectives have been similar to other projects, and have reported similar results.

While interactive cable television instruction is still a fairly new technology, the research is beginning to indicate that systems can be effective, cost efficient, and viable alternatives to live instruction. The benefits, problems, and drawbacks need continued research before a definitive statement can be made about this technological solution to an educational problem.

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Appendix

CARROLL INSTRUCTIONAL TELEVISION CONSORTIUM

Student Survey
1985 - 1986

Your School _____

Instructor _____

Course _____

Did you take a TV course last year?

☐ Yes

☐ No

****

Please rate the following questions on a scale of 1 - 5 (1 = poor, 2 = below average, 3 = average, 4 = above average, 5 = excellent), and make any additional comments you care to.

1. What was your opinion of the TV classes before this class?

   ☐ no opinion ☐ poor idea ☐ average idea ☐ above average idea

2. Why did you have that opinion? _____

   _____

3. Is the reception of the picture good enough for following the lecture, copying materials, and taking notes? _____ (1-5)

4. Can you hear the instructor, and the students in the other schools? _____ (1-5)

5. Do you feel that the talkback feature allowed you to participate as effectively in this class as in regular classes? _____ (1-5)

6. Do you feel as comfortable learning from the TV teacher as you do from a teacher in a regular class? _____ (1-5)

7. Is the teacher accessible to you outside of regular class time? _____ (1-5)

   Please describe when and how the teacher is accessible to you.

   _____

8. Do you feel you have an opportunity to get to know your classmates from the other schools as well as you get to know your classmates in a regular class? _____ (1-5)

9. Have you been receiving hand-outs and other materials from the teacher in time for assignments? _____ (1-5)

10. Do you feel the material presented in this class has been as easy to follow as material presented in regular classes? _____ (1-5)

11. How well do you like the TV class? _____ (1-5)

12. In general, how well do you like school? _____ (1-5)

Are there any additional comments you would like to make?